

IN THE CLAIMS:

1. (Currently Amended) A method of detecting a predetermined alarm condition in a combustion emission gas, the method comprising:

exposing to the gas a semiconductor gas sensor having a p-type semiconducting material, the semiconducting material ~~being responsive both to a change in concentration of a reducing gas in the surrounding atmosphere and to a change in concentration of oxygen in the surrounding atmosphere to exhibit a change in its electrical resistance changing electrical resistance in relation to the concentrations of oxygen and carbon monoxide in the surrounding atmosphere over at least a range of atmospheric compositions via an expression of the form~~

$$R_G = A[O_2]^{-1/x} + B[O_2]^{-1/x} [CO]^{\frac{1}{x}}$$

where R_G is the observed sensor resistance, O_2 is the oxygen concentration, CO is the carbon monoxide concentration, A , B are constants which depend on the sensor resistance under reference conditions, and x is a parameter which depends on the point defect chemistry of the oxide system;

monitoring the resistance; and

outputting an alarm signal if the resistance exceeds a predetermined value corresponding to the alarm condition.

2. (Currently Amended) [[A]] The method according to claim 1, wherein the reducing gas is one of CO, H₂, CH₄ and higher hydrocarbons.

3. (Cancelled)

4. (Currently Amended) [[A]] The method according to any of the preceding claims, claim 1 wherein the p-type semiconductor material comprises a metal oxide.

5. (Currently Amended) [[A]] The method according to any of claims claim 1 [[to 3,]] wherein the p-type semiconductor material comprises a mixed metal oxide.

6. (Currently Amended) [[A]] The method according to claim 4 or claim 5, wherein the metal is of the first, second and/or third order transition metal series.

7. (Currently Amended) [[A]] The method according to claim [[6]] 1, wherein the semiconductor p-type semiconductivity material comprises a p-type oxide of the CrTi-0 system.

8. (Currently Amended) [[A]] The method according to claim [[6]] 1, wherein the semiconductor p-type semiconductivity material comprises a p-type Cr-Ti-Mn-Co system, CuO with T'02 or Coo with K02.

9. (Currently Amended) [[A]] The method according to any of the preceding claims, claim 1 wherein the combustion emission gas is a flue gas.

10. (Currently Amended) A combustion emission gas alarm system comprising:
a semiconductor gas sensor having a p-type semiconducting material, the semiconducting material being responsive both to a change in concentration of a reducing gas in the surrounding atmosphere and to a change in concentration of oxygen in the surrounding atmosphere to exhibit a change in its electrical resistance changing electrical resistance in relation to the concentration of oxygen and carbon monoxide in the surrounding atmosphere over at least a range of atmospheric compositions via an expression of the form

$$R_G = A[O_2]^{-1/x} + B[O_2]^{-1/x} [CO]^{\frac{1}{x}}$$

where R_G is the observed sensor resistance, O_2 is the oxygen concentration, CO is the carbon monoxide concentration, A , B are constants which depend on the sensor resistance under reference conditions, and x is a parameter which depends on the point defect chemistry of the oxide system; and

apparatus for monitoring the resistance of the semiconducting material and [[for]] issuing an alarm signal if the resistance exceeds a predetermined value corresponding to an alarm condition.

11. (Cancelled)

12. (Currently Amended) [[A]] The system according to claim 10 or ~~claim 11~~, wherein the p-type semiconducting material comprises a metal oxide.

13. (Currently Amended) [[A]] The system according to claim 10 or ~~claim 11~~, wherein the p-type semiconducting material comprises a mixed metal oxide.

14. (Currently Amended) [[A]] The system according to claim 12 or claim 13, wherein the metal is of the first, second and/or third order transition metal series.

15. (Currently Amended) [[A]] The system according to claim 13 or ~~claim 14, 10~~ wherein the semiconductor p-type semiconducting material comprises a p-type oxide of the Cr-i-O system.

16. (Currently Amended) [[A]] The system according to claim 13 or claim 14 10,
wherein the semiconductor p-type semiconducting material comprises a p-type CuO with TiO₂ or
CoO with TiO₂.

17. (Currently Amended) [[A]] The system according to any of claims 10 to 16 claim
10 wherein the system is mounted to or adjacent to a flue gas outlet so as to expose the sensor to
a gas the flue gas.